Abstract

This project will be my implementation of a super resolution algorithm. It will first be tested using a text recognition program and some toy data. Then it will be tested under the specifications of a vision assistant.

1. Introduction

There have been several methods of super resolution for digital images developed. Some involve hallucinating extra detail based on similar types of images, others involve using multiple low resolution images to get one high resolution image. I will be implementing an algorithm of the later type.

I will be testing the practical effectiveness of the implemented algorithm using an OCR (optical text recognition) program on first the low resolution images and then the resulting high resolution image. Objective improvement in image resolution can then be determined on the percent of correct identification of words.

My final step will be to prepare the algorithm for use with a vision assistant. In order to do this I will have to re-implement the algorithm in C++ and test it for images that conform to the type and resolution that will be acquired from the device.

2. Project Details

2.1. Algorithm

I will be using a super resolution algorithm discussed by Assaf Zomet and Shmuel Peleg [1]. This method starts off by modeling the process of imaging. This includes modeling of geometric transformation, blurring, subsampling and noise. The super resolution can be calculated using a conjugate-gradient based approach [1]. Zomet and Peleg’s approach references work by Elad and Feuer, 1999, Capel and Zisserman, 1998, Capel and Zisserman, 2000.

2.2. Data Set

For my first data set I plan on using images from a video sequence used by Peleg and Zomet. This video sequence can be downloaded from this webpage: http://www.cs.huji.ac.il/~zomet/superResolution.html

For my second data set I will acquire my own images of street signs and bus signs which will be similar to those that might be acquired and used by the vision assistant.

2.3. Test Method

One pretty objective way to test whether the algorithm created improvement would be by using a text recognition system. I found simpleocr which is a free optical character recognition software. It can be found at http://www.simpleocr.com/. Using this program on the high resolution image if available, the low resolution images, and the high resolution image generated from the super resolution algorithm should give tangible evidence on the effectiveness of the super resolution implementation.

2.4. Timeline

Here is a rough timeline for the project

- Week 1: read paper thoroughly
- Weeks 2-3: implement algorithm
- Week 4: test on video sequence data set
- Week 5: collect data set 2
- Weeks 6-7: use algorithm on second data set and test with simpleocr
- Weeks 8-9: Implement in C++
- Weeks 9-10: write up of research
References


